What is claimed is:

1. A method for monitoring broadcast multi-media content, comprising the steps of:

(a) receiving multimedia source content;

(b) generating identification information related to the source content;

(c) imperceptibly and repeatedly embedding the audio component of said multimedia source content with said identification information;

(d) transferring said identification information to a central repository; and

(e) transmitting the embedded multimedia content through one or more broadcast networks.

2. The method of claim 1, further comprising:

(f) receiving the transmitted multimedia content; and

(g) processing said received multimedia content to extract identification information related thereto.

3. The method of claim 1, wherein a detectability metric is produced by assessing the success of said embedding and the detectability metric together with said identification information is transferred to a central repository.

4. The method of claim 2, wherein extraction of the identification information is conducted in the presence of multiple transmission channel impairments.

5. The method of claim 1, wherein said embedding is repeated in the temporal domain.

6. The method of claim 1, wherein said embedding is repeated at different frequencies.

7. The method of claim 1, wherein said embedding is repeated in both the temporal and frequency domains.

8. The method of claim 2, wherein multiple copies of embedded information are extracted to improve the reliability of multimedia monitoring.

9. The method of claim 2, wherein multiple copies of embedded information are extracted to estimate the duration of multimedia content embedded with identification information.

10. The method of claim 8, wherein said multiple copies are extracted from the multimedia content received from a single transmission channel.

11. The method of claim 8, wherein said multiple copies are extracted from the multimedia content received from a plurality of transmission channels.

12. The method of claim 8, wherein said multiple copies are extracted using a redundant network of receivers.

13. The method of claim 12, wherein said redundant receivers are deployed in separate geographical locations.

14. The method of claim 1, wherein the embedded multimedia content is transmitted over at least one terrestrial broadcast channel.

15. The method of claim 1, wherein the embedded multimedia content is transmitted over at least one Internet broadcast channel.

16. The method of claim 1, wherein the embedded multimedia content is transmitted over at least one cable broadcast channel.

17. The method of claim 1, wherein the embedded multimedia content is

transmitted over at least one satellite broadcast channel.

18. The method of claim 2, wherein said extracted identification information is used to identify at least one of:

     (i)   broadcast advertisement content,

     (ii)   broadcast music content,

     (iii)   broadcast television or radio program content.

19. The method of claim 1, wherein:

copies of embedded information are extracted from the transmitted multimedia content, and

spacing of the extracted copies is used to estimate boundaries of back-to-back encoded multimedia clips.

20. The method of claim 1, wherein:

the transmitted multimedia content is received; and

the effectiveness of monitoring is enhanced by measuring received transmission channel characteristics to provide a measure of the quality of at least one of a received transmission or a transmission channel.

21. The method of claim 20, wherein said received transmission channel characteristics comprise at least one of Signal-to-Noise-Ratio (SNR) and dropped packet rate.

22. The method of claim 1, wherein the detectability metric is used at monitoring sites to improve the reliability of detection reports.

23. The method of claim 1, wherein the detectability metric and measured transmission channel characteristics are used at monitoring sites to improve the reliability of multimedia monitoring.

24. The method of claim 23, wherein said received transmission channel

characteristics comprise at least one of Signal-to-Noise-Ratio (SNR) and dropped packet rate.

25. The method of claim 1, wherein the identification information is re-embeddable with modified embedding strength based on the detectability metric.

26. The method of claim 1, wherein the type and extent of impairments present in a transmission channel are identified based on the quality of information extracted from the embedded multimedia content carried on said channel.

27. The method of claim 1, wherein multiple points of origin of a composite transmission of said embedded multimedia content are differentiated.

28. The method of claim 27, wherein said multiple points of origin comprise at least one of:

      (i)   a local broadcast segment of a given networked television broadcast,

      (ii) a regional broadcast segment of a given networked television broadcast,

      (iii) a national broadcast segment of a given networked television broadcast,

      (iv) an interstitially inserted advertisement in an Internet stream.

29. The method of claim 1, wherein prior to the transmission of multimedia content in step (f), the multimedia content is examined for the presence of a valid watermark.

30. The method of claim 29, wherein the validity of an embedded watermark is ascertained by verifying the embedded identification information against information residing in a database.

31. A system for monitoring broadcast multi-media content, said system comprising:

(a) a receiver for receiving multimedia source content;

(b) identification information generating means for generating identification information related to the source content;

(c) an embedder for imperceptibly and repeatedly embedding an audio component of said multimedia source content with said identification information;

(d) transfer means for transferring said identification information to a central repository;

(e) a transmitter for broadcasting the embedded multimedia content through one or more broadcast networks;

(f) reception means for receiving said broadcast multimedia content; and

(g) a processor for processing the received broadcast multimedia content to extract identification information related thereto.

32. The multimedia monitoring system of claim 31, further comprising watermark assessment means for producing a detectability metric by assessing the success of said embedding and transfer means for transferring said detectability metric together with said identification information to a central repository.

33. The multimedia monitoring system of claim 31, wherein extraction of embedded information is conducted in the presence of multiple transmission channel impairments.

34. The multimedia monitoring system of claim 31, wherein said embedding is repeated in the temporal domain.

35. The multimedia monitoring system of claim 31, wherein said embedding is repeated in different frequency domains.

36. The multimedia monitoring system of claim 31, wherein said embedding is repeated in both the temporal and frequency domains.

37. The multimedia monitoring system of claim 31, wherein extraction of multiple

copies of embedded information is used to improve the reliability of multimedia monitoring.

38. The multimedia monitoring system of claim 31, wherein extraction of multiple copies of embedded information is used to estimate a duration of multimedia content embedded with identification information.

39. The multimedia monitoring system of claim 38, wherein said multiple copies are extracted from the multimedia content received from a single transmission channel.

40. The multimedia monitoring system of claim 38, wherein said multiple copies are extracted from the multimedia content received from a plurality of transmission channels.

41. The multimedia monitoring system of claim 38, wherein said multiple copies are extracted using a redundant network of receivers.

42. The multimedia monitoring system of claim 41, wherein said redundant receivers are deployed in separate geographical locations.

43. The multimedia monitoring system of claim 31, wherein at least one transmission channel for the broadcast multimedia content is a terrestrial broadcast channel.

44. The multimedia monitoring system of claim 31, wherein at least one transmission channel for the broadcast multimedia content is an Internet broadcast channel.

45. The multimedia monitoring system of claim 31, wherein at least one transmission channel for the broadcast multimedia content is a cable broadcast channel.

46. The multimedia monitoring system of claim 31, wherein at least one

transmission channel for the broadcast multimedia content is satellite broadcast channel.

47. The multimedia monitoring system of claim 31, wherein said extracted identification information is used to identify at least one of:
  (i)   broadcast advertisement content,
  (ii)   broadcast music content,
  (iii) broadcast television or radio program content.

48. The multimedia monitoring system of claim 31, wherein spacing of extracted copies of embedded information is used to estimate the boundaries of back-to-back encoded multimedia clips.

49. The multimedia monitoring system of claim 31, wherein the effectiveness of monitoring is enhanced by measuring received transmission channel characteristics to provide a measure of the quality of at least one of a received transmission or a transmission channel.

50. The multimedia monitoring system of claim 49 wherein said channel characteristics comprise at least one of Signal-to-Noise-Ratio (SNR) and dropped packet rate.

51. The multimedia monitoring system of claim 31, wherein the detectability metric is used at monitoring sites to improve the reliability of detection reports.

52. The multimedia monitoring system of claim 31, wherein the detectability metric and measured transmission channel characteristics are used at the monitoring sites to improve the reliability of multimedia monitoring.

53. The multimedia monitoring system of claim 31, wherein the identification information is re-embeddable with a modified embedding strength based on the detectability metric.

54. The multimedia monitoring system of claim 31, wherein the type and extent of impairments present in a transmission channel for the broadcast multimedia content are identified based on a quality of extracted information from the embedded multimedia content.

55. The multimedia monitoring system of claim 31, wherein multiple points of origin of a composite transmission of said embedded multimedia content are differentiated.

56. The multimedia monitoring system of claim 55, wherein said multiple points of origin comprise at least one of:

      (i) a local broadcast segment of a given networked television broadcast,

      (ii) a regional broadcast segment of a given networked television broadcast,

      (iii) a national broadcast segment of a given networked television broadcast,

      (iv) an interstitially inserted advertisement in an Internet stream.

57. The multimedia monitoring system of claim 31, wherein prior to the transmission of multimedia content in step (f), the multimedia content is examined for the presence of a valid watermark.

58. The system in accordance with claim 57, wherein the validity of an embedded watermark is ascertained by verifying the embedded identification information against information residing in a database.

59. A method for real-time embedding of identification information into an audio component of multimedia content, comprising:

      separating the audio component from a video component of said content;

      embedding the audio component imperceptibly and repeatedly with identification information; and

      combining the video component with the embedded audio component so that

synchronization between video frames and the corresponding audio component is preserved.

60. The method of claim 59, wherein said audio component is in analog form, is converted into digital form prior to embedding, and is converted back into analog form after said embedding.

61. The method of claim 59, wherein multiple audio components are embedded.

62. Apparatus for real-time embedding of identification information into an audio component of multimedia content, comprising:

an audio-video separator for separating audio and video components of said content;

an audio watermark embedder for embedding the audio component imperceptibly and repeatedly with identification information; and

an audio-video combiner for combining the video component with the embedded audio component so that synchronization between video frames and the corresponding audio component is preserved.

63. Apparatus in accordance with claim 62, wherein an analog-to-digital converter is used to convert said audio component into digital form prior to embedding, and a digital-to-analog converter is used to convert the audio component back into analog form after said embedding.

64. Apparatus in accordance with claim 62, wherein multiple audio components are embedded.